

BAX 453 Application Domains

Last Updated: 2/19/2023

Contact Information:

Instructor: Sharad Gupta

Email: skgupta@ucdavis.edu

Phone: 925-791-3677

Webpage: <https://gsm.ucdavis.edu/profile/sharad-gupta>

Office Hours: By appointment (please email me)

Course Information:

Quarter: Spring, 2023

Mode: Lecture, text/readings, exercises

Sessions: The course consists of ten session, as outlined below.

Session	1	2	3	4	5	6	7	8	9	10
Date	4/8	4/8	4/22	4/22	5/6	5/6	5/20	5/20	6/3	6/3

Course Description:

In the rapidly evolving business landscape of today, data science has become a powerful tool for organizations to enhance business performance, drive growth, and foster innovation. This course focuses on the practical application of data science in different business domains, providing students with a comprehensive understanding of the WHY (business value proposition of data science), the WHAT (data science problems in high-yield business domains), and the HOW (end-to-end data science solution framework, including artificial intelligence & machine learning). The course covers high-value data science use cases in business domains such as marketing, social media, digital customer experience, streaming, and healthcare. Since applying data science is a team sport, the course also covers cross-functional stakeholders and their roles in an organizational context.

Throughout this course, students will acquire practical knowledge of applied data science and end-to-end project delivery in their organizations. They will engage in several advanced analytics projects, employing predictive analytics techniques, to solve various business use cases. Examples of these business use cases include sentiment analysis, topic modeling,

customer churn, customer segmentation, and recommender systems, using both supervised and unsupervised machine learning techniques. The students will work on end-to-end project activities, which will require them to articulate business cases, build machine learning models, and develop project reports. Effective communication and influence are crucial components of successful data science projects. Therefore, the course will teach storytelling strategies and offer opportunities for students to apply them in their team projects. The course will also feature industry leaders who will share their experiences of applying data science to drive data-driven insights and deliver business outcomes in their organizations.

Course Vision:

The vision of this course is to equip students with practical skills and knowledge to successfully execute end-to-end data science projects in high-yield business domains and deliver positive business outcomes within their organizations.

Course Materials:

1. Selected readings and cases (available digital Harvard Business Review subscription)
2. Occasional handouts for extra readings in class or via Canvas

Course Schedule:

The course blends various learning methods, including lectures, assigned readings, classroom discussions, class presentations, and a final project. The ten sessions in the course will cover pre-assigned readings, theory lectures, practical lectures, engaging class activities, and an overview of assignments.

Note: Please note that this schedule may be adjusted before or during the course, based on the pace of learning.

#	Date	Topics & Assignments
1	Session 1	<p>Applied Data Science Landscape:</p> <ol style="list-style-type: none"> 1. Course Introduction 2. Human Decision-Making (Judgement & Biases) 3. Key Internal & External Drivers 4. Business Value Proposition 5. Business Context and Practical Considerations <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p>

		<ol style="list-style-type: none"> 1. <i>Are You Still Prioritizing Intuition Over Data?</i> by Tomas Chamorro-Premuzic - HBR 2. <i>Why Companies That Wait to Adopt AI May Never Catch Up</i> - HBR 3. <i>8 Ways Machine Learning Is Improving Companies' Work Processes</i> - HBR 4. <i>Big Data: the management revolution</i> - HBR
2	<p>Session 2</p> <p>1. Individual Short-Paper #1 Due</p>	<p>Applied Data Science Framework (People):</p> <ol style="list-style-type: none"> 1. Data Science as a Team Sport 2. Data Science Team Roles & Responsibilities 3. Organizational Stakeholders <p>Applied Data Science Framework (Process):</p> <ol style="list-style-type: none"> 1. Artificial Intelligence & Machine Learning Landscape 2. Machine Learning (Classification & Regression) Refresher 3. Applied Data Science Process Model 4. Business Context and Practical Considerations <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>What is your data strategy</i> - HBR 2. <i>5 Essential Principles for Understanding Analytics</i> - HBR 3. <i>What Every Manager Should Know About Machine Learning</i> - HBR 4. <i>Why You're Not Getting Value from Your Data Science</i> - HBR
3	<p>Session 3</p> <p>1. Individual Short-Paper #2 Due</p>	<p>Applied Data Science Framework (Technology):</p> <ol style="list-style-type: none"> 1. Data Science Reference Architecture 2. Data Science Technology Platforms Landscape 3. Commercial Data Science Technology Platforms 4. Business Context and Practical Considerations <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>The Best Data Scientists Get Out and Talk to People</i> - HBR 2. <i>How to Win with Machine Learning</i> by Ajay Agrawal, Joshua Gans, and Avi Goldfarb - HBR 3. <i>A Better Way to Put Your Data to Work</i> by Veeral Desai, Tim Fountaine, and Kayvaun Rowshankish - HBR 4. <i>4 Ways to Democratize Data Science in Your Organization</i> by Thomas C. Redman and Thomas H. Davenport - HBR
4	<p>Session 4</p>	<p>Applied Data Science (Social Media):</p> <ol style="list-style-type: none"> 1. Social Media Analytics Overview 2. Common Business Use Cases (Sentiment Analysis, Social Listening, Others) 3. Common Data Science Techniques 4. Business Context and Practical Considerations

		<p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>Sentiment Analysis Can Do More than Prevent Fraud and Turnover - HBR</i> 2. <i>The Basic Social Media Mistakes Companies Still Make - HBR</i> 3. <i>Fix Your Social Media Strategy by Taking It Back to Basics - HBR</i> 4. <i>How to Start Thinking Like a Data Scientist by Thomas C. Redman - HBR</i>
5	<p>Session 5</p> <p>1. Individual Short-Paper #3 Due</p> <p>2. Individual Assignment #1 Due</p>	<p>Applied Data Science (Marketing):</p> <ol style="list-style-type: none"> 1. Marketing Analytics Overview 2. Common Business Use Cases (Segmentation, Customer Churn, Others) 3. Common Data Science Techniques 4. Business Context and Practical Considerations 5. Guest Lecture <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>Why customer analytics matter - McKinsey Article</i> 2. <i>How advanced analytics can help contact centers put the customer first - McKinsey</i> 3. <i>Quantifying the Impact of Marketing Analytics - HBR</i> 4. <i>How to Design an AI Marketing Strategy by Thomas H. Davenport, Abhijit Guha, and Dhruv Grewal - HBR</i>
6	<p>Session 6</p> <p>1. Individual Short-Paper #4 Due</p>	<p>Applied Data Science (Digital Customer Experience):</p> <ol style="list-style-type: none"> 1. Digital Customer Experience Overview 2. Common Business Use Cases (ChatBots, Recommender Systems, Others) 3. Common Data Science Techniques 4. Business Context and Practical Considerations 5. Guest Lecture <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>A technology blueprint for personalization at scale - McKinsey</i> 2. <i>Using Analytics to Prevent Customer Problems Before They Arise by Paul D. Berger and Bruce D. Weinberg - HBR</i> 3. <i>Customer Experience in the Age of AI by David C. Edelman and Mark Abraham</i> 4. <i>3 Ways AI Is Getting More Emotional - HBR</i>
7	<p>Session 7</p> <p>1. Individual Short-Paper #5 Due</p>	<p>Applied Data Science (Healthcare):</p> <ol style="list-style-type: none"> 1. Healthcare Analytics Overview 2. Common Business Use Cases (Population Health, Risk Modeling, Others) 3. Common Data Science Techniques

		<p>4. Business Context and Practical Considerations</p> <p>5. Guest Lecture</p> <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>Boosting Health Care Payer Performance with Advanced Analytics - Boston Consulting Group</i> 2. <i>How a Pharma Company Applied Machine Learning to Patient Data - HBR</i> 3. <i>Insurers Hold the Key to Healthcare’s Digital Future - Bain & Company</i> 4. <i>Using machine learning to unlock value across the healthcare value chain - McKinsey</i>
8	<p>Session 8</p> <p>1. Individual Assignment #2 Due</p>	<p>Data Science Project Delivery (End-to-End):</p> <ol style="list-style-type: none"> 1. Business Case 2. Project Scoping 3. Solution Approach 4. Cross-functional Team & Stakeholders 5. Delivery Planning 6. Business Context and Practical Considerations <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>How to Decide Which Data Science Projects to Pursue by Hilary Mason - HBR</i> 2. <i>Data Science and the Art of Persuasion - HBR</i> 3. <i>Present Your Data Like a Pro by Joel Schwartzberg - HBR</i> 4. <i>Do Your Data Scientists Know the ‘Why’ Behind Their Work? by Thomas C. Redman - HBR</i>
9	<p>Session 9</p>	<p>Transformation & Change Management:</p> <ol style="list-style-type: none"> 1. Organizational Change 2. Experimentation & A/B Testing 3. Agile Approach 4. Business Context and Practical Considerations 5. Team Presentation Guidelines <p>Discussions & Review:</p> <ol style="list-style-type: none"> 1. Class Discussions 2. Assignment Review 3. Final Project Presentation Review <p>Pre-Reading Material:</p> <ol style="list-style-type: none"> 1. <i>An Agile Approach to Change Management by Sarah Jensen Clayton - HBR</i> 2. <i>Break Down Change Management into Small Steps by Jeff Kavanaugh and Rafee Tarafdar - HBR</i> 3. <i>A Refresher on Randomized Controlled Experiments by Amy Gallo - HBR</i> 4. <i>When Machine Learning Goes Off the Rails by Boris Babic, I. Glenn Cohen,</i>

		<i>Theodoros Evgeniou, and Sara Gerke - HBR</i>
10	Session 10 1. Team Assignment Due	Team Project Reports & Presentations

Team Assignment:

During the course, students will work on a team assignment that will require them to apply the concepts, methods, and techniques covered in class. The details of the project will be provided during the course.

Grading (subject to change before the beginning of the course):

There are 100 total points possible for this course. Distribution of these points is given below:

- 1. Class Participation - 15 points (15% of grade)**
 - a. *Class attendance and discussion (15 points)*
- 2. Individual Short-Papers - 15 points (15% of grade)**
 - a. *5 Individual short-papers (3 points each)*
- 3. Individual Assignments - 35 points (35% of grade)**
 - a. *Individual Assignments #1 (20 points)*
 - b. *Individual Assignments #2 (15 points)*
- 4. Team Assignments - 35 points (35% of grade)**
 - a. *Team Assignment (35 points)*

Code of Academic Conduct:

<https://ossja.ucdavis.edu/code-academic-conduct>